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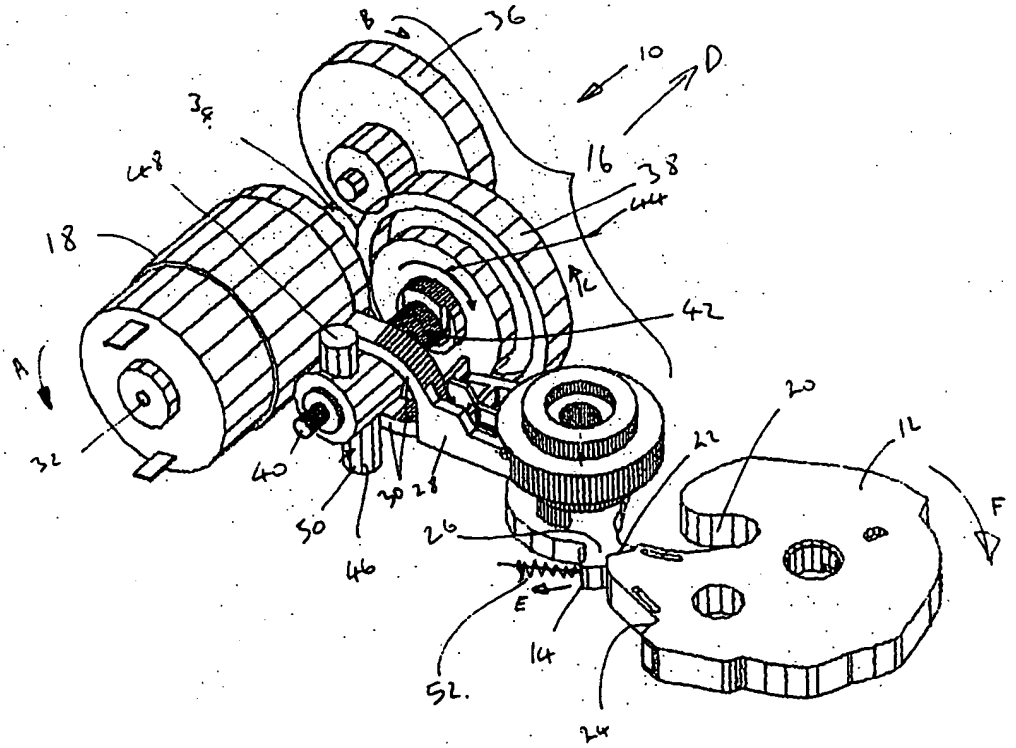
(54) Latch arrangement

(57) A latch arrangement (10) including a latch bolt (12) having at least an open and closed position for releasably retaining a striker in use, the latch bolt being releasably held in at least a closed position by a pawl (14), the pawl being operably connected to an actuator (18) by a transmission path (16), such that powered actuation of the actuator causes the pawl to release the latch bolt for opening, the latch arrangement further including means operable to return the actuator to a rest position, independent of movement of the pawl.



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Description

[0001] The present invention relates to latch arrangements, and in particular latch arrangements which can be power opened.

[0002] According to the present invention there is provided a latch arrangement including a latch bolt having at least an open and closed position for releasably retaining a striker in use, the latch bolt being releasably held in at least a closed position by a pawl, the pawl being operably connected to an actuator by a transmission path, such that powered actuation of the actuator causes the pawl to release the latch bolt for opening, the latch arrangement further including means operable to return the actuator to a rest position, independent of movement of the pawl.

[0003] Advantageously such a latch arrangement only requires powering in one direction. Furthermore with the actuator in a rest condition the pawl is independent from the actuator, thus allowing it to properly engage the first safety abutment and/or closed abutment of the latch bolt.

[0004] The invention will now be described, by way of example only, with reference to the figure which shows an isometric view of the major parts of a latch arrangement according to the present invention.

[0005] With reference to the figure there is shown a latch arrangement 10 including a latch bolt 12, a pawl 14, a transmission path 16 and an actuator 18. Further components of the actuator arrangement (such as the housing) have been omitted for clarity.

[0006] The latch bolt 12 includes a mouth 20 for releasably retaining a striker in use. Latch bolt 12 is rotatable between a closed position as shown in the figure and an open position. Latch bolt 12 includes a closed abutment 22 and a first safety abutment 24.

[0007] Pawl 14 includes an engagement arm 26 for engagement with closed abutment 22 or first safety abutment 24. Pawl 14 is rotatable from an engaged position as shown in the figure to a disengaged position where engagement arm 26 is disengaged from closed abutment 22 and first safety abutment 24.

[0008] The pawl 14 further includes a disengagement arm 28, the end of which is in the form of a yoke 30.

[0009] Actuator 18 is a power actuator, in this case, an electric motor. Mounted on the output shaft 32 of the motor is a gear pinion 34. Gear pinion 34 engages first reduction gear 36 which in turn engages second reduction gear 38. Second reduction gear 38 rotates about gear shaft 40, which includes a threaded portion 42. Mounted around gear shaft 40 is a coil spring 44 (shown schematically), one end of which is connected to gear shaft 40 and the other end of which is connected to the latch chassis (not shown).

[0010] A nut 46 is in threaded engagement with threaded portion 42 and includes opposing pins 48 and 50 which engage corresponding arms of yoke 30.

[0011] It will be noted that pin 50 is longer than pin 48 and that portion of pin 50 remote from shaft 40 further engages a slot (not shown) fixed relative to the chassis (not shown) of the latch arrangement, and aligned with the axis of shaft 40. As such nut 46 cannot rotate relative to shaft 40, but is free to translate length wise relative to shaft 40 as dictated by the threaded engagement of the nut with the threaded portion 42.

[0012] It can be seen that transmission path 16 therefore comprises at least gear pinion 34, first reduction gear 36, second reduction gear 38, threaded portion 42, nut 46, pins 48 and 50, yoke 30, and disengagement arm 28, these being components that operably connect the motor to the engagement arm 26 of the pawl.

Operation of the latch arrangement is as follows

[0013] As shown in the figure the latch arrangement is in a closed position.

[0014] When it is required to open the latch arrangement, the motor is powered such that output shaft 32 is caused to rotate in the direction of arrow A, causing first reduction gear 36 to rotate in the direction of arrow B, causing second reduction gear 38 to rotate in the direction of arrow C, causing nut 46 to translate in the direction of arrow D, causing yoke 30 to also translate in the direction arrow D, causing disengagement arm 28 and engagement arm 26 to both rotate in the direction of arrow E thus disengaging the pawl and hence allowing latch bolt 12 to rotate in the direction of arrow F to an open position whereupon a striker (not shown) is released.

[0015] It will be noted that coil spring 44 will have been wound up during this release movement causing energy to be stored therein.

[0016] Once the striker has been released, and the motor is no longer powered, the energy stored in coil spring 44 is released causing the nut 46, first and second reduction gears 36 and 38, gear pinion 34 and output shaft 32 to return to their at rest positions as shown in the figure.

[0017] However, it can be seen that the abutment of pins 48 and 50 with arms of yoke 30 is a lost motion connection and the action of returning nut 46 to its at rest position as shown in the figure does not cause yoke 30 to return to this position.

[0018] In fact yoke 30 is returned to this position by pawl spring 52 (shown schematically) which acts between engagement arm 26 and the chassis (not shown) of the latch arrangement. In particular when the latch bolt in its open position the actuator, when not powered, is in its rest position. When the associated door is closed and the latch bolt 12 is rotated to its closed position (as shown in the figure) the first safety abutment is initially caused to move past engagement arm 26, followed by the closed abutment. It will be appreciated that the pawl spring 52 causes the engagement arm 26 to sequentially engage firstly the first safety abutment and then the closed abutment. Because of the lost motion connection

between yoke 30 and pins 48 and 50, engagement arm 26 can carry out this action independent of the motor.

[0019] Thus it can be seen that the motor only needs to be powered in one direction, it being returned to the rest position by the action of coil spring 44.

[0020] Furthermore, once the motor is in its rest position, it does not interfere with the sequential engagement of the pawl with the first safety abutment and close abutment in view of the lost motion connection.

Claims

1. A latch arrangement (10) including a latch bolt (12) having at least an open and closed position for releasably retaining a striker in use, the latch bolt being releasably held in at least a closed position by a pawl (14), the pawl being operably connected to an actuator (18) by a transmission path (16), such that powered actuation of the actuator causes the pawl to release the latch bolt for opening, the latch arrangement further including means operable to return the actuator to a rest position, independent of movement of the pawl.

2. A latch arrangement as defined in claim 1 in which the means is a resilient means (44).

3. A latch arrangement as defined in claim 2 in which the resilient means is a spring, especially a coil spring (44).

4. A latch arrangement defined in any preceding claim in which movement of the actuator from the rest position to an actuated position acts to store energy in the means.

5. A latch arrangement as defined in any preceding claim in which there is a lost motion connection in the transmission path to provide for the return of the actuator to the rest position independent of movement of the pawl.

6. A latch arrangement as defined in claim 5 in which the lost motion connection is in the form of an abutment on a nut (46) in lost motion connection with a further abutment of the transmission path (30).

7. A latch arrangement as defined in claim 6 in which the nut is on the actuator side of the lost motion connection.

8. A latch arrangement as defined in claim 6 or 7 in which the further abutment of the transmission path is in the form of a yoke (30).

9. A latch arrangement as defined in claim 8 in which the yoke is on the pawl side of the lost motion connection.

10. A latch arrangement as defined in any preceding claim in which the pawl is biased into engagement with the latch bolt by a further resilient means (52).

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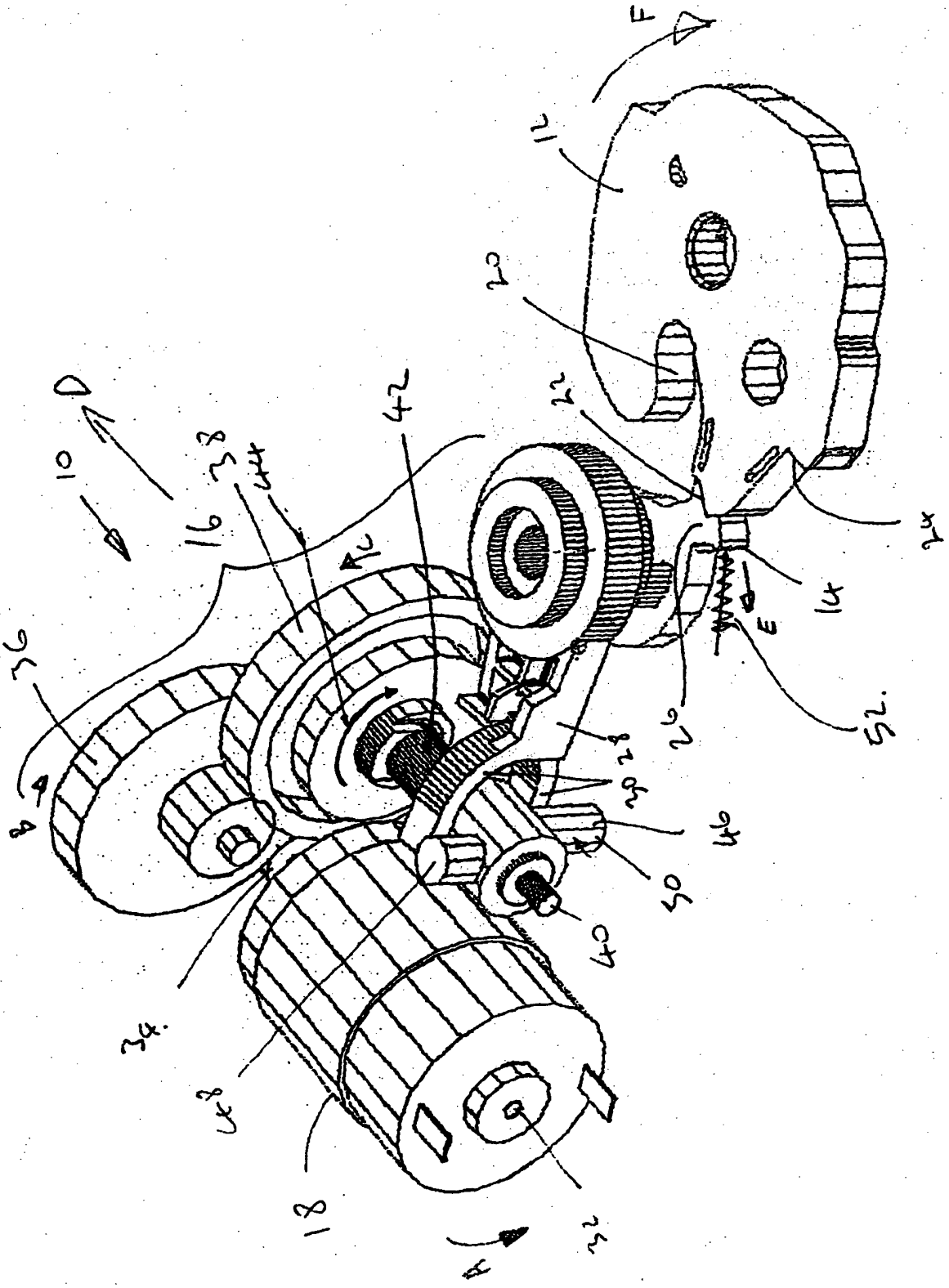

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